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IN THE CLAIMS:

1. (Currently Amended) A data communications system, comprising:

1
a plurality of individually modulated ~~transmission~~ carriers; and
a receiver that includes a front-end that receives said modulated carriers, and a
synchronization processor that develops an offset measure between a clock employed in
creating ~~said modulated transmission carriers~~ and a clock of said receiver by, in
frequency domain, processing phases of said plurality of received modulated carriers one
or more receivers, where each receiver has advance knowledge of relationships between
phases of a transmitter's unmodulated carriers; and a means to synchronize signals
between the transmitter and receivers, based on an inherent structure in the frequency
domain representation of the received waveform, without additional 'pilot' signals,
synchronization patterns, or other special synchronization signals or waveforms.

2. (Currently Amended) The system of claim 1, where said offset is a timing
offset, and said processing operates on a plurality of pairs of said received modulated
carriers, taking account of frequency separation between carriers within each of said pairs
the transmitter's and receivers' signals' sample timing is being synchronized.

3. (Original) The system of claim 2, where the individually modulated
transmission carriers are Orthogonal Frequency Division Multiplexed carriers.

4. (Currently Amended) The system of claim 2 where said processing on said
plurality of pairs develops a set of results, and develops said timing offset from the set of
results the frequency domain representation of the received signal is a form of the Fourier
Transform.

5. (Currently Amended) The system of claim 4, where carriers of a pair in said
pairs are adjacent to each other in the frequency domain ~~the form of the Fourier~~
~~Transform is the Fast Fourier Transform.~~

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6. (Currently Amended) The system of claim ~~2-4~~, where carriers of a pair in said pairs are equally spaced in the frequency domain, but not adjacent to each other the structure of the frequency domain representation is the collective phase relationships between a plurality of individual carriers.

7. (Currently Amended) The system of claim 6 where the processor, in computing the timing offset, computes means to synchronize the timing of signals is based on computing the differences in phase between said received a plurality of individual carriers.

8. (Currently Amended) The system of claim ~~7-4~~, where carriers of a pair in said pairs are not equally spaced in the frequency domain the means to compute the differences in phase between individual carriers is by using a differential in frequency detection scheme.

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19. (Currently Amended) The system of claim ~~18~~ 4 where said timing offset between any pair of modulated carriers is developed ~~the means to remove the carriers'~~ ~~data modulation is~~ by raising the complex representation of the modulated carriers ~~amplitude and phase~~ to an integer power.

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20. (Currently Amended) The system of claim 19 where the ~~modulation of the~~ carriers are modulated is by an N-level phase modulation schema and the ~~data modulation is removed by raising the complex representation of the carriers~~ are raised ~~amplitude and phase~~ to the N^{th} power.

21. (Currently Amended) The system of claim 20 where the modulation is Quadrature Phase Shift Keying and ~~the data modulation is removed by raising the~~ ~~complex representation of the carriers~~ are raised ~~amplitude and phase~~ to the fourth power.

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26. (Currently Amended) The system of claim ~~1~~ 22 where ~~(the means to~~ synchronize the operating frequency) ~~is based on computing the phases of a plurality of~~ said received modulated individual carriers.

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27. (Original) The system of claim 26 where the plurality of carriers are used in combination to determine the synchronization with the contribution of each carrier weighted according to its accuracy.

28. (Original) The system of claim 27 where the accuracy of each carrier's contribution is determined based on the carrier's amplitude.

29. (Currently Amended) The system of claim 28 where, for each carrier, the carrier's amplitude and phase, represented by a complex number in a Cartesian coordinate system, is summed with the other carriers' complex representation to yield a composite vector sum, representing the composite amplitude and phase; said processor further employing and a means to use the phase of this composite vector to create a frequency synchronization signal.

30. (Original) The system of claim 29 where the carriers' modulating data signals are known by the receivers and can be used to determine the precise transmitter carriers' phases.

31. (Original) The system of claim 29 where the carriers' modulating data signals are not known by the receivers but can be estimated by attempting to demodulate the carriers and then used to estimate the transmit carriers' phases.

32. (Original) The system of claim 29 where the carriers' modulating data signals are not known by the receivers but where the effect of the modulation can be removed from the carriers without demodulating the carriers.

33. (Original) The system of claim 32 where the means to remove the carriers' data modulation is by raising the complex representation of the carrier amplitude and phase to an integer power.

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34. (Original) The system of claim 33 where the modulation of the carriers is by N level phase modulation and the data modulation is removed by raising the complex representation of the carrier amplitude and phase to the N^{th} power.

35. (Original) The system of claim 34 where the modulation is Quadrature Phase Shift Keying and the data modulation is removed by raising the complex representation of the carrier amplitude and phase to the fourth power.

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44. (Currently Amended) A method in a data communications system; that includes including a plurality of individually modulated transmission carriers, the method comprising the steps of:

receiving in a receiver said plurality of individually modulated carriers,

developing in said receiver a synchronizing signal from computed phases in the frequency domain of said individually modulated carriers; and

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applying said synchronizing signal to synchronize the plurality of modulated carriers that are received by said receiver

~~storing information about relationships between a plurality of transmission carrier phases in their unmodulated states at one or more receivers; and~~
~~synchronizing signals between the transmitter and receivers, based on an inherent structure in the frequency domain representation of the received waveform, without additional 'pilot' signals, synchronization patterns, or other special synchronization signals or waveforms.~~

45. (Currently Amended) The method of claim 44, where the transmitter's and receivers' signals' sample timing of said received carriers is being synchronized.

46. (Original) The method of claim 45, where (the individually modulated transmission carriers) are Orthogonal Frequency Division Multiplexed carriers.

47. (Original) The method of claim 45, where the frequency domain representation of the received signal is a form of the Fourier Transform.

48. (Original) The method of claim 47, where the form of the Fourier Transform is the Fast Fourier Transform.

49. (Original) The method of claim 45, where the structure of the frequency domain representation is the collective phase relationships between a plurality of individual carriers.

50. (Original) The method of claim 49, where (the synchronizing of the timing of signals) is based on computing the differences in phase between a plurality of individual carriers.

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51. (Original) The method of claim 50, where computing of the differences in phase between individual carriers is by using a differential-in-frequency detection scheme.

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53. (Original) The method of claim 50 where the plurality of carriers used are adjacent in frequency.

54. (Original) The method of claim 50 where the plurality of carriers used is equally spaced but not adjacent.

55. (Original) The method of claim 50 where the plurality of carriers used may not be equally spaced but may be arbitrarily selected by the receivers.

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60. (Currently Amended) The method of claim ~~44-58~~ where data that modulates the carriers' ~~modulating data signals are~~ is not known by the receivers, but can be estimated by attempting to demodulate the carriers and then using the derived modulating data to estimate the transmit carriers' phases.

61. (Currently Amended) The method of claim ~~44-58~~ where data that modulates the carriers' ~~modulating data signals are~~ is not known by the receivers, but

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where the effect of the modulation can be removed from the carriers without demodulating the carriers.

62. (Original) The method of claim 61 where the means to remove the carriers' data modulation is by raising the complex representation of the carrier amplitude and phase to an integer power.

63. (Original) The method of claim 62 where the modulation of the carriers is by N level phase modulation and the data modulation is removed by raising the complex representation of the carrier amplitude and phase to the N^{th} power.

64. (Original) The method of claim 63 where the modulation is Quadrature Phase Shift Keying and the data modulation is removed by raising the complex representation of the carrier amplitude and phase to the fourth power.

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